



## **EDC 349 Methods and Materials: Teaching Mathematics in the Elementary School**

Course Syllabus – Spring 2013

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Office Hours (Tyler 103):

Tuesday: 2:30 – 5:30 PM

Wednesday: 8:00 – Noon and 3:00 – 4:30 PM

Thurs. 8:00 – 10:00 AM

### **Catalog Course Description**

This course focuses on the methods and materials for teaching mathematics in the elementary school based on the National Council of Teachers of Math standards. Prerequisites or co-requisites: MAT103, MAT104, and admission to the teacher education program.

### **Applicable Montana PEPP Standards: 10.58.508**

- (a) Demonstrate knowledge and understanding and use the major concepts, principles, theories, and research related to the development of children and young adolescents to construct learning opportunities that support individual students' development, acquisition of knowledge, and motivation.
- (b) Demonstrate knowledge and understanding and use the central concepts as outlined in Montana's student content and performance standards, tools of inquiry, and structures of content for students across grades K-8 and can engage students in meaningful learning experiences that develop students' competence in subject matter and skills for various developmental levels.
- (b) (iii) Demonstrate knowledge and understanding of and use the major concepts, procedures, and reasoning processes of mathematics that define number systems and number sense, geometry, measurement, statistics and probability, and algebra, in order to foster student understanding and use of patterns, quantities, and spatial relationships that can represent phenomena, solve problems, and deal with data.
- (b) (iv) Demonstrate knowledge and understanding of and use interdisciplinary connections to integrate subject matter contents, employing inclusive ideas and issues that engage students' ideas, interests, concerns, and experiences
- (c) Plan and implement instruction based on knowledge of individual students, learning theory, subject matter, curricular goals, and community.
- (c) (i) Demonstrate understanding of how students within different populations, including Montana American Indians, differ in their development and approaches to learning and create instructional opportunities that are adapted to diverse learners.

- (c) (ii) Demonstrate understanding of and use a variety of teaching routines and strategies that encourage students' development of critical thinking, problem solving, and performance skills, including the appropriate use of current and emerging technologies.
- (c) (iii) Apply knowledge and understanding of individual and group motivation and behavior among students to develop active engagement in learning, self-motivation, and positive interaction and to create supportive learning environments.
- (c) (iv) Apply knowledge and understanding of effective verbal, nonverbal, and electronic communication techniques to develop inquiry, collaboration, and supportive interaction
- (d) Demonstrate knowledge and understanding of and use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social-emotional, and physical development of each student.

### **Standards Based Course Goals and Learner Outcomes**

This course is designed to facilitate your growth as an effective teacher of elementary Mathematics. At the conclusion of this course you should:

- Have a clear understanding of your own philosophy about teaching Math
- Be able to write meaningful and clear lesson objectives
- Be able to write effective, creative, original MT Common Core Standards lesson plans
- Be able to demonstrate effective teaching techniques
- Have a broader understanding of math content
- Create effective methods of introducing and teaching new content
- Develop a philosophy regarding effective classroom management techniques
- Be able to create plans and teach in a way that meets the needs of all learners
- Have a clear understanding of the Montana Common Core Standards
- Recognize and exploit the rich opportunities to make a positive difference in the lives of your students through effective, dynamic math instruction

### **Text and Required Materials**

Helping Children Learn Mathematics, 8<sup>th</sup>, 9<sup>th</sup>, or 10<sup>th</sup> Edition

Robert E. Reys, Mary M. Lindquist, Diana V. Lambdin, Marilyn N. Suydam

### **Attendance**

Attendance is essential because class experiences cannot be recreated independently. Missing more than one class will result in your final grade being reduced by 1/3 of a letter grade (i.e. B reduced to B-). If difficulties or special circumstances arise please contact me.

### **Academic Responsibilities and Accountability**

This syllabus represents a learning contract. Your success in the course is dependent upon successful completion of course requirements, assignments, and tasks while maintaining high standards of academic integrity as described in the college catalog on pages 41 - 42. Please review and familiarize yourself with this material.

## Grading

All of your work throughout the semester should be kept in a three ring binder portfolio. Your final grade will be determined through a final evaluation of your work and the progress you have demonstrated. The percentages listed below are provided as a guideline to help you to understand the scope and importance of the various elements of the course content.

|  |           |
|--|-----------|
| Personal math autobiography and philosophy | 10 points |
| Participation / class projects             | 20 points |
| Problem Solving Project                    | 20 points |
| Lessons and Teaching                       | 25 points |
| Thematic Unit                              | 25 points |

Grading Range:

|    |          |    |         |    |         |    |          |
|----|----------|----|---------|----|---------|----|----------|
| A  | 95 - 100 | B  | 83 - 86 | C  | 73 - 76 | D  | 63 - 66  |
| A- | 90 - 94  | B- | 80 - 82 | C- | 70 - 72 | D- | 60 - 62  |
| B+ | 87 - 89  | C+ | 77 - 79 | D+ | 67 - 69 | F  | Below 60 |

## Course Outline and Assignments

### Personal Math Autobiography and Philosophy (Suggested length: 2 - 3 pages)

#### Part 1 – Your Experiences as a Math Learner

Write about your learning experiences in mathematics throughout your educational career as a student. What topics, lessons, teachers, incidents, or experiences had positive or negative impacts on how well you learned math, and how you currently perceive mathematics. What was the impact and why?

#### Part 2 – How will you Teach Math?

Your past experiences as a learner of mathematics may play a role in how you teach math in the future. These experiences will likely shape the methods, tactics, and philosophies you will employ as a teacher. Using Tables 2-2 and 2-3 in chapter 2, review the Suggestions for Teachers. Which suggestions will you implement based on your past experiences and current beliefs about how children learn math? And why are these suggestions most important to you?

### Class Participation and Projects

We will strive to create an interactive, dynamic learning environment in which your participation and input is vital. Everyone will teach and learn from each other in an environment that encourages creativity, the free flow of ideas, and a great deal of learning and interaction. It's critical that you come to each class willing to share ideas, information, analysis and evaluation, and provide positive, constructive feedback and reflections. There will be a variety of class projects and activities in which your participation and effort will be evaluated.

### Problem Solving Math Project

Create a real-world project for the grade level of your choice that explores a variety of math concepts through problem solving. The problem should be challenging, meaningful, connected, grade level appropriate, layered, and should involve creative problem-solving skills. By creating this project, your understanding of math and teaching mathematics should be greatly enriched.

Potential ideas include:

- Students explore traveling to a variety of destinations comparing efficiency, costs, etc.
- Students compare and contrast patterns occurring in nature then using math concepts
- Students collect, display, & analyze data such as grades, sport statistics, etc.

Your submission should include the following:

- A final hard copy of the actual project that you would hand out to the students
- A one page summary describing:
  1. Math topics explored
  2. Project objectives
  3. Desired learned outcomes

### **Lesson Plans and Teaching**

You will be asked to create your own original mini lessons in class and actual lesson plans. The full lessons will be team taught to classmates and if possible taught to children at local schools.

Plans will be evaluated on the following:

- |   |                                       |
|---|---------------------------------------|
| • Creativity                              | • Standards based content             |
| • Clear objectives                        | • Appropriate adaptations             |
| • Clear, logical, motivating introduction | • Effective presentation              |
| • Scope and sequence of activities        | • Clear closing strategy              |
| • Organization                            | • Appropriate method(s) of assessment |

### **Five Lesson Thematic Math Unit**

Thematic units investigate one theme from a variety of perspectives and approaches. Using a thematic concept of instruction connects topics within the subject area, expands and enhances understanding, increases motivation, and provides a holistic learning experience.

Create, develop and write a one-week Mathematics Thematic Unit consisting of 5 complete lesson plans. The unit should be designed for grade 5. The first step is to pick a theme. Use one of the examples listed below or a Math topic of your own choosing. Possible themes:

- |                             |                          |
|-----------------------------|--------------------------|
| • Fractions                 | • Measurement            |
| • Probability               | • Addition / Subtraction |
| • Multiplication / Division | • Big numbers            |
| • Patterns                  | • Probability            |
| • Geometry                  | • Problem Solving        |
| • Ratios                    | • Real World Math        |

### Required Elements:

1. Three paragraph description of the unit
2. One-paragraph Unit Objective that is a well-written description of the theme and the overriding instructional objectives of the unit. The unit objective gives direction and meaning to the unit
3. Five original MT Common Core Standards based lesson plans following the full lesson plan format

### **Important Links:**

Montana Common Core Standards:

[http://opi.mt.gov/Curriculum/montCAS/MCCS/index.php#gpm1\\_4](http://opi.mt.gov/Curriculum/montCAS/MCCS/index.php#gpm1_4)

NCTM

<http://www.nctm.org/>

PBS Math Lessons

<http://www.pbs.org/teachers/math/>

## **EDC 349 Schedule - Spring 2013**

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### **1.7 - Week One**

Chapter 1 - School Mathematics in a Changing World

Chapter 2 – Helping Children Learn Mathematics with Understanding

### **1.14 - Week Two**

Chapter 3 – Planning and Teaching

Chapter 4 - Assessment: Enhanced Learning and Teaching

**Personal Autobiography Due on Thursday**

### **1.21 - Week Three**

Chapter 5 - Processes of Doing Mathematics

Chapter 6 - Helping Children with Problem Solving

### **1.28 - Week Four**

Chapter 7 – Counting and Number Sense in Early Childhood and Primary Grades

Chapter 8 - Extending Number Sense: Place Value

### **2.4 - Week Five**

Chapter 9 - Operations: Meanings and Basic Facts

### **2.11 - Week Six**

Chapter 10 - Computational Tools: Calculators, Mental Computation, and Estimation

### **2.18 - Week Seven**

Chapter 11 - Standard and Alternative Computational Algorithms

Thematic Unit and Problem Solving Project Workshop

Thursday Math Explorations

Grade 1

Grade 3

Grade 5

### **2.25 - Week Eight**

Chapter 12 - Fractions and Decimals: Meaning and Operations

Thursday Math Explorations

Grade 1

Grade 3

Grade 5

### **3.4**

Spring Break

### **3.11 - Week Nine**

Chapter 13 - Ratio, Proportion, and Percent: Meanings and Applications

Thursday Math Explorations

Grade 1

Grade 3

Grade 5

**3.18 - Week Ten**

Chapter 14 - Algebraic Thinking

Thursday Math Explorations

Grade 1

Grade 3

Grade 5

**Problem Solving Projects Due on Thursday**

**3.25 - Week Eleven**

Chapter 15 - Geometry

Tuesday Math Explorations

Grade 1

Grade 3

Grade 5

**4.1 - Week Twelve**

Chapter 16 – Measurement

Thursday Math Explorations

Grade 1

Grade 3

Grade 5

**4.8 - Week Thirteen**

Chapter 17 - Data Analysis, Statistics, and Probability

**4.15 - Week Fourteen**

Content Review

**Thematic Units Due on Thursday**

**4.22 - Week Fifteen: Dead Week**